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# Integrating DOI and Phoenix Mechanism for Immutable yet Adaptive Record-Keeping

## Abstract

This proposal explores the integration of the Digital Object Identifier (DOI) system with the Phoenix mechanism from OntoMotoOS to create a new paradigm for transparent and adaptive record-keeping. DOI technology provides a framework for immutable, persistent identification of records, ensuring accountability and traceability in public documentation [1] [2]. The Phoenix mechanism, by contrast, offers a dynamic process of post-failure learning and ethical evolution, allowing systems or individuals to "rise from the ashes" of mistakes with documented remediation [3]. We argue that combining these two complementary approaches can yield an infrastructure of **responsible transparency** and **adaptive governance**. In such a framework, every significant record (personal, institutional, or societal) is permanently identifiable and citable (via DOI) while accompanied by a **Phoenix loop** of continuous improvement – enabling records to remain transparent and immutable, yet augmented with layers of context, correction, and growth. The paper outlines the theoretical basis of this DOI×Phoenix synergy, illustrates application scenarios in governance, organizations, and personal narratives, and discusses implications for transparency, responsibility, and the "right to evolve." We also address technical and social considerations for implementing this combined system. The integration of DOI and Phoenix ultimately represents a **complementary ethics of record**: preserving a truthful public memory of events and decisions, while actively incorporating the lessons of failure into an evolving public record.

## Introduction

In an era of information ubiquity and institutional accountability, the integrity and adaptability of record-keeping systems have become paramount. Public and private organizations alike face the challenge of maintaining **immutable records** for transparency, while also needing mechanisms to update practices and learn from mistakes. Too often, record systems present a trade-off between permanence and adaptability: records can be permanent but inflexible, or editable but prone to erasure of history. This paper proposes a solution that marries two seemingly disparate concepts – the Digital Object Identifier (DOI) system and the Phoenix mechanism from OntoMotoOS – to overcome this dilemma. We posit that DOI's capacity for persistent, citable identification of records, combined with Phoenix's capacity for post-failure recovery and ethical learning, can form the backbone of a new **responsible transparency** infrastructure.

**Digital Object Identifiers (DOIs)** are well known in scholarly and data communities as persistent unique identifiers for content such as articles, datasets, and reports [1]. A DOI attached to an object guarantees a stable reference that can always be resolved to the object's latest location or information, even if its physical or digital location changes [4]. This reliability has made DOI a gold standard for citation and long-term access in digital libraries. However, beyond academia, the DOI concept – a globally unique, permanent ID for any object – holds potential as a framework for any public record that demands immutability and accountability. A DOI can be assigned to "any object — physical, digital, or abstract" and serves to "keep track of things" by ensuring they are persistently and uniquely identified and accessed reliably [2]. In the context of public records, one can imagine laws, civic documents,

organizational decisions, or even personal milestones each tagged with a DOI-like identifier, guaranteeing that they remain part of a permanent, citable public memory.

Complementing this, the **Phoenix mechanism** originates from OntoMotoOS, a meta-operating system philosophy that emphasizes continual improvement and ethical alignment in complex systems. The Phoenix component of OntoMotoOS is inspired by the mythological Phoenix's rebirth: it is a fail-safe loop for learning from mistakes and recovering from failures [3]. In practice, Phoenix in OntoMotoOS entails a distributed ledger of events (the **PhoenixRecord**) and a recovery protocol (the **Phoenix Loop**). Every decision or significant event in the system is logged to the PhoenixRecord – an append-only, tamper-evident ledger visible to all authorized participants – which creates intrinsic transparency and trust in the system's history [5] [6]. If a component or agent in the system misbehaves or a critical failure occurs, the Phoenix Loop triggers isolation of the offending process, analysis of what went wrong, and a reset or corrective action before reintegration [7]. Philosophically, this ensures that **failures are not hidden or terminal**; instead, they are recorded and become occasions for redemption and evolution in the system's ethical framework [3]. As one description puts it, the PhoenixRecord "records the history, decisions, and legacy" of each entity, preserving who you have been and the path of your choices [8] – thereby embedding an institutional memory that includes both successes and failures.

The convergence of these two frameworks – one emphasizing **immutability** and the other **evolution** – is the focus of this proposal. We aim to develop the core argument that DOI and Phoenix together form a **complementary ethics of record**: DOI contributes the principle that records should be permanent, citeable, and accountable, while Phoenix contributes the principle that systems should continuously learn and adapt from the past rather than merely be bound by it. The sections that follow lay out the theoretical background of each component, articulate the integrated DOI×Phoenix approach, explore concrete application scenarios at personal, institutional, and societal levels, and discuss the broader implications for transparency, responsibility, and the right to evolve. We conclude with considerations on implementing such an infrastructure and its significance for future-oriented record systems.

# Theoretical Background

**Digital Object Identifier (DOI) System.** The DOI system is a globally adopted framework for providing permanent, unambiguous identifiers to digital and physical content. Managed by the International DOI Foundation (IDF) and standardized as ISO 26324, a DOI is an alphanumeric string that **uniquely identifies an object and persists over time**, even if the object's location or ownership changes [1]. Each DOI is associated with metadata about the object and a resolution service (doi.org) that redirects users to the object's current URL or resource. The chief benefit of the DOI system is in ensuring that once something is entered into the public record of knowledge, it remains findable and citable. In scholarly publishing this has meant that articles, data sets, and reports can be reliably referenced decades after publication. More generally, the DOI infrastructure demonstrates how a **persistent identifier** scheme can uphold immutability and accountability: once a DOI is registered for an item, that item's record in the global registry is effectively permanent and publicly queryable. Even if the content itself is updated or moved, the DOI record can point to new versions or locations, or issue notices (such as retraction notices) without invalidating the original identifier. This makes DOI a framework for immutable public records in the sense that each identifier is a lasting anchor point in the digital landscape of information. It is conceivable to extend DOI assignment beyond academic objects to **public governance records, legal documents, organizational decisions, or personal digital archives**, providing each important record a lifetime-guaranteed "reference handle." The DOI's strength lies in its **accountability through traceability**: every DOI-led reference can be resolved to an authoritative record of what the object is, who created it, and where to find it, thereby fostering trust in the integrity of records.

**OntoMotoOS and the Phoenix Mechanism.** OntoMotoOS is an experimental meta-operating system framework that integrates principles of ontology, ethics, and distributed consensus to manage intelligent agents and processes. Within this framework, the Phoenix mechanism serves as a critical component for resilience and ethical continuity. It comprises two interrelated elements: the **PhoenixRecord**, which is a distributed ledger (or log) of system events, and the **Phoenix Loop**, a protocol for recovery and learning. The PhoenixRecord is essentially an append-only, tamper-resistant log that tracks the history of decisions, actions, and outcomes (including failures) across the network of agents [6] [9]. All nodes in the system maintain this ledger in consensus, meaning no single authority can alter the past unilaterally [6]. This design guarantees that there is **no single point of truth** that could be manipulated – everyone sees the same sequence of record entries, which fosters a shared accountability. The Phoenix Loop builds on this reliable record to handle failures: if a particular agent or process violates the agreed rules or crashes, the system can isolate that agent and revert it to a safe state (essentially "reset" it) based on last known good records [7]. Other agents are notified of the incident via the PhoenixRecord log (acting like an alarm), and cooperative action can be taken – for example, peers might take over the failed tasks or initiate an investigation into the cause [10]. Importantly, the Phoenix mechanism isn't merely a technical reboot; it embodies an ethical stance of remediation. The offending agent may be audited or retrained before returning to normal operation [11], implying that **the system as a whole learns from the failure**. The philosophical underpinning of Phoenix is that **every failure or wrongdoing becomes part of the recorded history and a trigger for improvement**, rather than something to be swept away. In other words, **persistence of memory plus enforced reflection** equals an evolving ethical system. OntoMotoOS thereby operationalizes a form of "redemptive transparency" – complete visibility into errors through the PhoenixRecord, coupled with structured opportunities to correct course (the "rise from ashes") via Phoenix Loops.

In summary, these two backgrounds present **complementary strengths**. DOI offers a **stable identification layer** for information – an architecture of **immutability, permanence, and citability**. Phoenix offers a **process layer** for systems evolution – an architecture of **resilience, accountability through logging, and adaptive learning**. The proposal at hand is to integrate these strengths into a unified approach to record-keeping and governance.

## Core Argument: DOI × Phoenix as Complementary Ethics of Record

**Integrating Immutability with Evolution.** On their own, the DOI system and the Phoenix mechanism address different ethical challenges of record-keeping. The DOI system ensures that information, once recorded, attains a kind of immortality in reference – an immutable presence in the public domain that can be consistently referred to. This addresses the ethical need for **accountability**: decisions and statements cannot simply vanish or be altered without trace; a DOI-tagged record "permanently and unambiguously identifies" the object or event it represents [1]. The Phoenix mechanism, by contrast, addresses the ethical need for **growth and remediation**: it ensures that errors or harmful actions are not only recorded but also drive a process of reflection, correction, and improvement [3] [11]. Our core argument is that combining these features yields a synergistic ethics of record. We call this **DOI×Phoenix integration** – a framework in which **every public record is immutable and traceable, yet not static or morally sterile**, because it carries with it the seeds of its own evolution.

In a DOI×Phoenix-enabled system, any significant record (for example, a policy document, a corporate decision, or a personal statement) would be assigned a DOI, securing its place as an unchangeable reference point. Rather than overwriting or deleting such a record when new information arises or mistakes are discovered, the system would invoke a Phoenix process: a follow-up PhoenixRecord entry would be created, linked to the original DOI, documenting the failure, debate, or learning that occurred

post-record. Crucially, this new entry (perhaps with its own DOI as well) does not erase the original – it **augments it**. The original DOI record remains accessible as the historical truth of what was decided or said; the Phoenix augmentation provides the context of evolution. In effect, **the DOI guarantees memory, and Phoenix guarantees progress**. Together they prevent the two extremes of record ethics: on one hand, historical revisionism or loss of accountability (which the DOI's immutability prevents), and on the other hand, ossification or refusal to adapt (which Phoenix's learning loop prevents).

**Accountable Records with Second-Order Context.** This complementary approach can be viewed as establishing two layers of truth for every record: a first-order truth (the record itself, fixed in time) and a second-order truth (the lived outcome and response to that record over time). The DOI layer secures the first-order truth: for instance, a law enacted in 2025 can be given a DOI that forever links to the official text of that law as it was passed. The Phoenix layer then handles second-order truth: if that law failed to achieve its purpose or caused unintended harm, the Phoenix process would create an official postmortem or amendment record – cryptographically linked to the original DOI – explaining what went wrong, what has been learned, and what new actions (repeal, revision) are being taken. By consulting the DOI, anyone in the public could not only retrieve the original law, but also see all subsequent "Phoenix" records of its history (e.g. a 2027 amendment DOI, a 2028 repeal DOI, along with narrative on the lessons learned). The result is a richer form of **accountability**: the public record is not just a static archive, but a living chronicle that includes how society or an institution dealt with the consequences of the initial entry. This inherently supports an ethical stance of **responsibility** – decision-makers know that not only will their decisions be permanently recorded, but also that any negligence or failure will likewise be permanently logged and must be addressed openly.

Moreover, this approach cultivates an ethic of **forgiveness and growth without forgetting**. Because the original records are not deleted or hidden, accountability is preserved; because the system allows attaching corrections/improvements, individuals and institutions are encouraged to learn and improve rather than to cover up. The DOI×Phoenix framework thus operationalizes what we might call a "right to evolve" alongside a "duty to remember." Individuals and organizations are given a pathway to rehabilitate or update records (honoring the right to evolve) but within a structure that never loses sight of the original facts (honoring the duty to remember). This balance is the hallmark of the DOI and Phoenix synergy, and it represents an emerging **ethics of record** suited for a future where both transparency and adaptability are highly valued.

## Application Scenarios

To concretize the DOI×Phoenix framework, we consider several application scenarios across different domains of record-keeping. These scenarios illustrate how the integration of immutable DOI records with Phoenix-based evolutionary logs can function in practice, from **public governance** to **organizational management** to **personal life narratives**.

- **Public Governance:** Government policies and civic records could be managed under a DOI×Phoenix system to enhance public trust. For example, each new law, regulation, or executive decision is registered with a DOI, guaranteeing an immutable public record of its content and context. If a policy fails or leads to public controversy, the Phoenix mechanism triggers an official review process: the outcomes of that review (investigative reports, amendments, or even formal apologies) are logged as new entries linked to the original law's DOI. A citizen querying the law's DOI would thus see not only the statute as passed, but also a timeline of **post-enactment records** documenting its impact and any subsequent changes. This creates a form of adaptive governance. Instead of quietly revising laws or burying failures, the government provides a transparent "history of practice" for each policy. The immutable DOI record holds officials accountable for the

original decision, while the Phoenix additions demonstrate responsiveness and willingness to learn. This could be applied to areas like public infrastructure projects (with DOI-identified project plans and Phoenix-logged outcome evaluations), environmental regulations (original standards and subsequent compliance audits/fixes), and beyond. The result is an enriched public archive that citizens, oversight bodies, and historians can audit for both **transparency of decision and transparency of evolution**.

- **Organizational Records:** Within corporations, NGOs, or academic institutions, DOI×Phoenix can revolutionize record management and ethics compliance. Imagine an organization's key decisions, policies, and reports each tagged with a DOI in an internal (or public) registry. A decision to launch a new product or an internal policy on data use, for instance, becomes a fixed record with a persistent identifier. Now add the Phoenix layer: if the product launch encounters a serious failure (say a safety issue) or the data policy results in a breach, the incident analysis and response are formally documented in the PhoenixRecord. These are linked to the original decision's DOI, so anyone reviewing that decision's history sees the **full lineage: initial intent, outcome, and corrective measures**. This approach strengthens internal accountability and learning. It institutionalizes practices akin to "post-mortems" or "after-action reviews." Rather than these reports being ad-hoc or hidden in archives, they become first-class, linked records. Over time, an organization builds a knowledge base of **what went wrong and how it was fixed**, connected back to each decision. This not only helps prevent repeat mistakes (as lessons are visible and retrievable), but also signals to stakeholders (shareholders, regulators, the public) that the organization is committed to transparency and continuous improvement. In sensitive domains like healthcare or aviation, such a system could track errors and fixes in a tamper-proof way (like a DOI for a clinical protocol and Phoenix logs for any adverse event analyses), marrying patient safety and accountability.

- **Personal Narratives:** On a personal level, the DOI×Phoenix approach can empower individuals to maintain authentic yet evolving life records. Consider personal blogs, social media posts, or digital diaries – today, individuals often delete or edit past posts that they regret or that contain inaccuracies. With a DOI×Phoenix framework, one could instead issue a DOI for a significant personal post (for instance, a public stance or a creative work) which preserves it as a timestamped record, and later use a Phoenix update to add context or growth. Suppose someone wrote a public commentary in 2020 that they later realized was misguided. Rather than erasing it (which in the digital age may be futile anyway), they could attach a Phoenix record in 2025 – an essay reflecting on how their views changed. Both the original and the reflection would be linked via the DOI. The original stands as an honest snapshot of the past self; the new entry demonstrates personal growth and learning. This can apply to narratives of recovery (e.g. a DOI-logged account of an addiction recovery journey with Phoenix updates marking relapses and progress) or educational growth (a student's project documented with subsequent iterations and improvements). Such a practice humanizes the notion of an immutable record – acknowledging that humans are not static. It provides individuals a structured way to embrace **accountability for past statements** while asserting their **right to evolve**. On a societal level, if such personal DOI records are shared (at one's discretion), it can foster empathy: society can see how people change over time through a transparent, iterative narrative, rather than a whitewashed or one-dimensional record.

These scenarios demonstrate that DOI×Phoenix integration is versatile. It can be tuned to fully public transparency (as in governance), semi-public or internal contexts (as in organizations), or personal/private use. Common to all is the idea of a **two-tier record**: a persistent core record (DOI) and an attached chain of follow-up records (Phoenix log) that together ensure information integrity **and** adaptability.

## Implications for Transparency, Responsibility, and the Right to Evolve

The combined DOI×Phoenix approach carries significant implications for how society balances openness, accountability, and the capacity to change. **Transparency** is enhanced in a nuanced way: not only is information open and permanent (the DOI aspect), but the process of change is also made transparent (the Phoenix aspect). Traditionally, transparency is conceived as making information available to the public. Here we extend it to mean transparent evolution – stakeholders can witness how and why a record changed over time. This could deepen trust, as nothing needs to be hidden: mistakes are visible, but so are corrections. It shifts the narrative from "they never err" (an unrealistic ideal) to "when errors occur, they are candidly acknowledged and addressed," which may be a more sustainable basis for public trust.

In terms of **responsibility**, the DOI×Phoenix framework reinforces a culture of owning one's actions and their outcomes. Knowing that any decision or statement will be indelibly recorded and tied to future consequences creates a strong incentive for decision-makers to act conscientiously from the start. Moreover, the Phoenix mechanism ensures that responsibility does not end at the point of action; it continues into responsibility for follow-up. For instance, a government agency under this system cannot simply publish a policy and move on – if that policy fails, the agency is implicitly responsible for producing the PhoenixRecord entry analyzing the failure and proposing remedial steps. This fosters an environment where continuous accountability is the norm. Leaders and institutions would be judged not just on initial promises or outcomes, but on how they respond to the aftermath. This aligns with modern ethical views that laud transparency and improvement over infallibility.

Crucially, the DOI×Phoenix model champions a **"right to evolve"** for individuals and institutions. In current digital-public discourse, there is tension between the right to be forgotten (removing past records to preserve privacy or allow change) and the public's right to know (keeping records for accountability). Our proposal offers a reconciliation: rather than forgetting (which undermines transparency) or unforgiving permanence (which can freeze people in their past errors), we ensure records endure **with** the allowance for evolution. One's past statements or decisions remain part of the record (no disappearances), but one has the right to append new chapters to that record that reflect growth, changed circumstances, or rectified beliefs. From an ethical standpoint, this is a more rehabilitative and humanizing approach to data permanence. A past offender, for example, could have the record of their offense remain public (satisfying society's need for accountability), but alongside it an official record of their rehabilitation or community service could be added – effectively annotating the past with the fact of improvement. Society, in turn, may become more willing to accept that people and systems can change for the better when such change is documented and verifiable, not merely claimed.

This approach also raises interesting **questions of narrative control and collective memory**. When every significant event comes with an evolving annotation, history becomes a layered construct. This could enrich collective memory, preventing simplistic or one-sided historical accounts. Future historians or auditors would have access to both the original data and the meta-data of its aftermath. However, it also means that crafting the "Phoenix response" becomes a matter of responsibility – there is potential for spin or framing in how one documents their learning. To counter that, a culture of open scrutiny of PhoenixRecords (perhaps via independent oversight or peer review in the case of institutions) would be necessary. The very existence of these implications underscores that DOI×Phoenix is not just a technical innovation, but a socio-ethical one: it requires norms and expectations to adjust around this new concept of what it means to keep a record honestly and constructively.

## Technical and Social Considerations

Implementing an integrated DOI and Phoenix mechanism infrastructure presents both technical challenges and social considerations. On the **technical side**, one must consider how to practically merge these systems. DOIs are managed by centralized or federated registration agencies under a global standard, whereas Phoenix as conceived in OntoMotoOS relies on a distributed ledger and consensus among participants. A potential implementation could leverage **distributed ledger technology (DLT)** (such as a blockchain or other tamper-evident logs) to serve as the backbone of the PhoenixRecord, while using the DOI scheme as the front-end identifiers for entries on that ledger. In essence, each DOI would correspond to an entry (or a set of entries) on a ledger that is append-only. Ensuring that DOI resolution can fetch not just the original object but also its linked Phoenix history would require extending DOI metadata or using the DOI as a key to query a public ledger. This could be achieved via existing DOI metadata schemas by including pointers to a “supplementary record” or via an overlay network that recognizes a certain DOI prefix as indicating a Phoenix-enabled record. Scalability and performance are also considerations: maintaining potentially massive linked histories for numerous records demands an efficient ledger. Techniques from modern distributed systems (sharding, federated consensus, or mesh networks as in OntoMotoOS) might be needed to distribute the load and avoid single points of failure [6]. Security is paramount; cryptographic signatures should verify the authenticity of Phoenix logs, so that only authorized parties can append official “evolution” records to a DOI (preventing malicious actors from falsifying a corrective entry). In sum, while conceptually straightforward, the integration will likely require novel platforms or standards that blend DOI’s **persistent ID resolution** with Phoenix’s **distributed logging and recovery**.

On the **social side**, adoption and governance pose significant questions. A DOI×Phoenix record-keeping system would touch on legal and cultural aspects of transparency. For instance, who decides when a Phoenix process is triggered for a given record? In a government context, should it be an independent audit agency that appends the Phoenix entry saying "this law failed in these ways"? In personal contexts, how do we respect privacy while encouraging a culture of adding corrective addenda to public statements? There is a risk that without proper incentives or mandates, individuals and organizations might enjoy the immutable DOI for positive publicity but shy away from voluntarily logging their failures. Overcoming this might involve policies or norms where failing to produce a Phoenix follow-up when evidence calls for one is seen as an ethical breach in itself. We might imagine regulations in governance that any policy yielding certain negative outcomes must be accompanied by a publicly posted impact review (the Phoenix record). Culturally, promoting the idea that mistakes will happen and it is honorable to document and fix them is key – this challenges the often punitive nature of public opinion. Education around the benefits of such a system will help: if people recognize that a company that openly logs its errors and corrections is more trustworthy than one that hides them, market or public pressure can drive adoption.

Another social consideration is **privacy and the right to be forgotten**. While our framework leans toward permanent records for the sake of accountability, there are situations (especially for personal data) where some information arguably should fade. Designing a humane DOI×Phoenix system might require tiered access or the ability to seal certain records after a time, absent public interest. Perhaps DOIs for personal records can be set to private mode after some years, accessible only to the individual or with consent. The Phoenix concept could even assist here: if a person has demonstrably reformed, maybe the "evolution record" can eventually serve in place of the original record in public view (with the original still existent but hidden except for serious inquiries). These are complex questions balancing transparency with forgiveness. Engaging ethicists, legal experts, and community stakeholders in shaping these policies will be as important as the software engineering.

Finally, it is worth considering incentives and maintenance. The DOI system today is maintained by a consortium of organizations; extending it to general public records might require new institutions or expanding existing ones (e.g., a **Public DOI Agency** for government records, or integration with archives). The Phoenix ledger would require a network of nodes – perhaps governmental, academic, and civil society partners – to host and validate entries, akin to how blockchain miners or validators work but in a permissioned, purpose-specific context. Ensuring funding and oversight for this infrastructure will be key to its longevity. Despite these challenges, the potential payoff – a society with a robust memory that is also capable of self-correction – makes it a worthy endeavor. We already see proto-examples in the world: post-incident reports are published after crises, versioned documents exist for legislation, and academic retractions are linked to original papers. The DOI×Phoenix proposal seeks to elevate and formalize these practices into a coherent system.

# Conclusion

This paper has presented a proposal to fuse the Digital Object Identifier system with the Phoenix mechanism of OntoMotoOS, envisioning a novel infrastructure for record-keeping that is at once **immutable and adaptive**. By leveraging DOI's proven framework for permanent, accountable records and Phoenix's innovative approach to logging failures and facilitating ethical growth, we can create a record ecosystem that embodies responsible transparency. In this ecosystem, nothing of significance is lost or hidden – every record is preserved as a citeable point of truth – yet nothing is beyond improvement – each record can spawn a lineage of reflective updates when needed. Such a DOI×Phoenix integration promises to strengthen trust in institutions (through unwavering accountability) while also encouraging progress (through an open commitment to learn and reform). We have argued that this combination yields a complementary ethics of record: one that values truth and memory, but not in a way that ossifies or punishes growth. Instead, it treats the public record as a living, self-correcting narrative.

The implications span from more **transparent governments**, to **learning organizations**, to **individuals owning their narrative of change**. Implementing this vision will require interdisciplinary collaboration – technologists to build the platforms, policymakers to set standards and requirements, and social leaders to champion a culture that embraces both accountability and forgiveness. Challenges notwithstanding, the integration of DOI and Phoenix can be seen as a future-oriented answer to the pressing question of how humanity should manage its collective memory in the digital age. We conclude that a DOI×Phoenix-based record system could serve as a cornerstone for **adaptive governance** in the 21st century – an era in which the only constant is change, and thus our records and our ethics of record-keeping must enable us not only to remember where we came from, but also to responsibly evolve toward what we aspire to become.

**Sources:** The concepts discussed draw on the DOI Handbook and literature on persistent identifiers [2], as well as on descriptions of the OntoMotoOS Phoenix mechanism in distributed ethical systems [3] [6]. These sources illustrate the feasibility and philosophical grounding of an immutable, append-only record (DOI/PhoenixRecord) combined with cycles of review and renewal (Phoenix Loop) as the basis for the proposal.

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[1] [4] Digital object identifier - Wikipedia
https://en.wikipedia.org/wiki/Digital_object_identifier

[2] Home Page
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